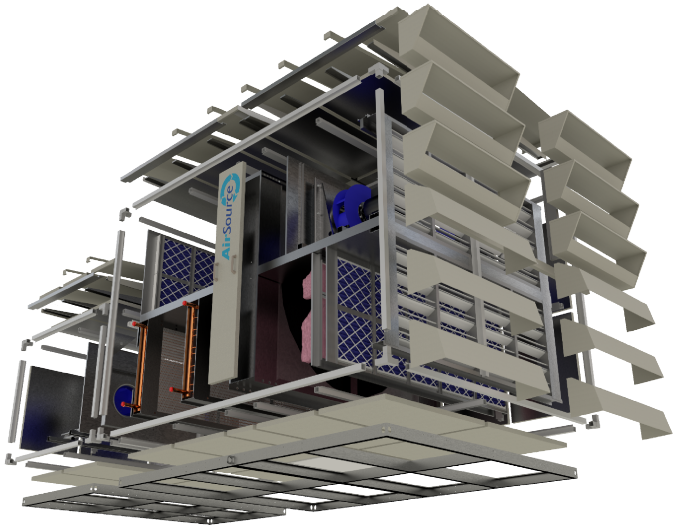
INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS



CustomAir

Air Handling Units

TempAir

AirSource Heatpumps

ERP 2018 COMPLIANT

FGR F-GAS REGISTERED COMPANY

CE

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CONTENTS

WARRANTY

General

To be read in conjunction with AirSource Ltd standard Terms & Conditions of Sale.

The equipment is covered against defective parts and workmanship under the terms of the AirSource Ventilation Ltd warranty for the period of 12 months from the date of delivery, and is restricted to installations within the UK only.

Any replacement parts supplied under the warranty shall be warranted for the unexpired period of the warranty or 3 months from delivery whichever period is the longer.

Procedure

In the event of component failure during the warranty period please notify our service department, the following details will be required to process any warranty claim:

- The unit serial number.
- Full commissioning documentation.
- Full description of the fault. Further details/checks may be required to be carried out prior to our engineer's attendance at site.
- A purchase order number in the event that the fault is not covered under the terms of the warranty.

An engineer will be scheduled to attend at the earliest availability to carry out an inspection/repair of the fault reported. Our response will depend on the availability of an engineer and the parts required to carry out the repair. Work outside of normal hours will not be covered under the terms of the warranty.

Any specific access equipment required for safe working is to be provided and erected for our use and any obstructions to the equipment are to be removed to enable a clear working area around the unit/faulty component. Sufficient space should be available for the removal of components if required – see installation requirements within this manual.

Invalidation of Warranty

The warranty may be refused for the following reasons:

- Failure to install, set up, put to work or maintain any part of the equipment as specified in AirSource Ventilation Ltd Installation, Operation and Maintenance Instructions.
- Misapplication of product or components.
- On receipt, failure to identify any damage to equipment on the delivery note & notify AirSource Ventilation Ltd in writing within three (3) days.
- Modifications to designed arrangement or performances without the prior written approval of AirSource Ventilation Ltd.
- Damage caused to equipment on site through lack of adequate protection from the elements or misuse by other trades.
- Failure to observe all normally accepted engineering practices during installation, commissioning and subsequent operation of equipment.

HEALTH & SAFETY

Important information
This symbol is provided to highlight important additional information.

Caution
This symbol identifies potential situations which could lead to the damage of equipment.

Danger
This symbol indicates situations which present hazardous conditions, which without applying strict health and safety procedures can result in serious personal injury or

General

This section deals with the hazards that could be encountered when any work is carried out on the equipment for which this manual is written. Therefore the following points should be observed to avoid any injuries or health hazards.

The installation of the unit shall be checked to ensure that:

- A suitable electrical supply is connected.
- Prior to entry to any section please ensure that the electrical supply is isolated either at the control panel or at the incoming mains. Please note that if the control panel isolator is switched off the incoming side of the electric supply will remain live. DO NOT enter the unit while the fans are running. After isolating the electrical supply wait 2 minutes for the fans to stop prior to removing fan covers.
- It is suitable for the atmosphere or the environment in which it is to be used. Coastal applications should be notified to the manufacturer prior to order.
- It is suitable for the working media, temperature and pressure for which it is to be used.
- Electrical equipment is earthed to comply with I.E.E. regulations and local by-laws.
- The procedure for removing and replacing filter media are fully carried out as set out in this manual.

Cautionary Notes

No part of the unit shall be dismantled until a careful study has been made of this manual.
This manual deals in detail with erection, commissioning, and servicing, and shall be strictly adhered to. Wherever any maintenance or work is done within the unit, the interior shall be left clean and all access panels and guards shall be correctly fastened.

Water Treatment

Check for any treatment that is required to the water supply for prevention of corrosion and scaling of equipment. Information regarding the necessary action to be taken can be obtained from the relevant Water Supply Authority, particulars of which can be found in the Waters Engineers Handbook yearly edition.

DELIVERY

General Upon receipt of equipment a visual inspection should be made and any damage noted on the delivery form. Particulars of any damage or short delivery should be endorsed by the driver delivering the equipment. No responsibility can be held for damage sustained during the unloading from the delivery vehicle or on the site thereafter.
All claims for damage or short delivery should be advised to AirSource Ltd in writing within three (3) days of receipt.

Unloading & Handling Lifting Points

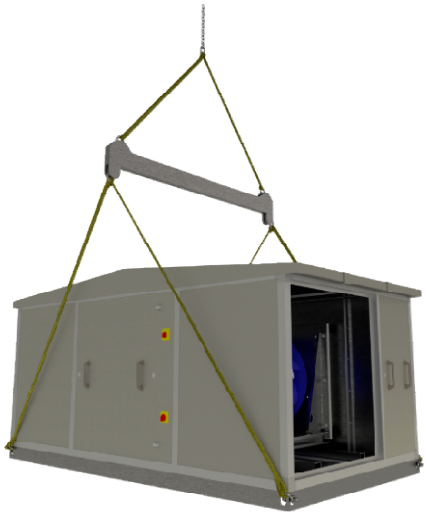
Fork lift

If off-loading with a Manitou or Fork lift, use fork extensions as required to extend past the full width of the unit.

IMPORTANT: Ensure the forks extend beyond the casing of the unit.

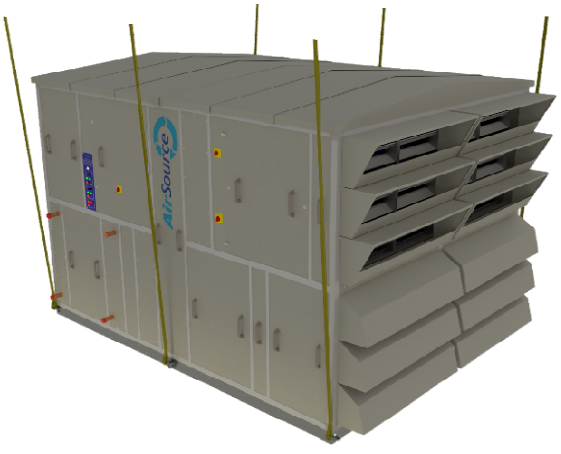
4 Point Crane Lift

Longer straps will reduce the sideways force applied to the roof and help prevent damage to the unit. Use of spreader beams is recommended to prevent damage to the sides of the AHU.



6 Point Crane Lift

Use of spreader beams is recommended to prevent damage to the sides of the AHU (all straps/chains should be vertical during lift).



Storage

MAINTENANCE OF EQUIPMENT HELD IN STORAGE FOR A PERIOD OF UP TO 2 YEARS

Interior If ducting is not connected it is essential that all inlets and discharge openings are completely sealed

Exterior The exterior shall be kept free from falling building materials, dampness or extreme cold or heat. The unit exterior surfaces should be inspected on a monthly basis and any sign of corrosion or scratches are to be treated immediately.

Static Indentation Machines fitted with ball bearings may be damaged if left stationary for too long
periods. The balls and races may suffer damage by fretting corrosion (false brinelling, stationary vibration or static vibration marking).

Belts & Pulleys Wedge belts should be removed from the pulleys and hung up and not exposed to excessive heat or cold and kept free from dampness. Belt life is reduced over a long period of non-use due to the curing and static condition of rubber. Pulleys already taper-locked to shafts can be lightly covered with rustproof compound. This must be thoroughly cleaned off prior to start up.

Filters All filters, whether in the form of bags or panels, must be suitably wrapped and sealed to prevent damp and ingress of dust or foreign bodies, and held in a dry store.

Fan Shaft Bearings During the interval between delivery and commissioning the drive belts should be slackened and the fan and motor shafts rotated one quarter of a revolution at intervals of once a week. Bearings fitted with shields should not be stored for periods exceeding two (2) years since the grease ages. Bearings stored for longer periods than that specified may be found to have a higher initial starting torque and the service life of the grease will then be shortened.
It is therefore advisable to repack the grease after twelve months of non use. Fan shafts and impellers should be protected with rustproof compound to prevent any corrosion taking place.

Electric Motors Clean out all the dust accumulated inside and outside the motor and make sure that all the component parts of the motor are in good condition. Cover all the ventilating holes on the motor frame to prevent dust from entering the motor. Apply a coating of anti-corrosion grease or other anti-corrosion agent on all the parts that may be subject to rusting. Care must be taken to see that the storeroom is always dry and well ventilated while the room temperature is regularly maintained above 0°C. During storage, periodic inspections should be made to check for moisture, rust or hardening of grease.

The above are intended to preserve the life of all static and moving parts of the equipment during the period of storage. It is advisable that regular attention of the equipment is maintained.

INSTALLATION

General

All units must be installed in accordance with good engineering standards, upright and level on a prepared base. Fixing down of air handling units is at the discretion of the installer and dependant of the site conditions. Flexible connections are NOT recommended for connecting ductwork to the unit, as the fan outlet is fitted with a flexible connector and is isolated from the unit via anti-vibration mounts. Provision must be made for a cleanable drain trap which should terminate at an open drain or tundish which will ensure any blockage can be seen and remedied. Units that are delivered in sections should be carefully checked with the general arrangement drawings to ensure erection in the correct sequence and handing. The sections would be bolted together as detailed on page 8. Site wiring must not penetrate or restrict opening or removal of access panels.

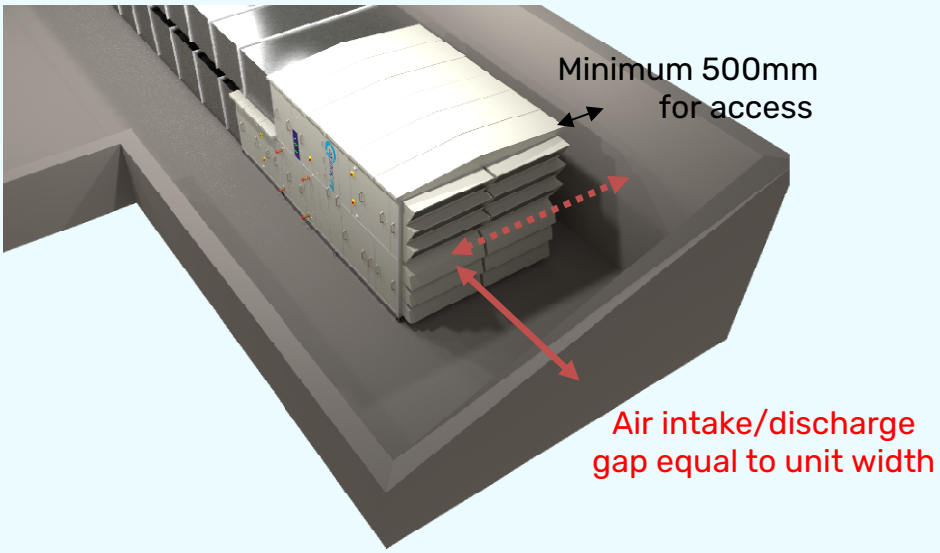
Locating Equipment

It is important to ensure that adequate access is provided around the perimeter of the AHU for maintenance purposes as follows:

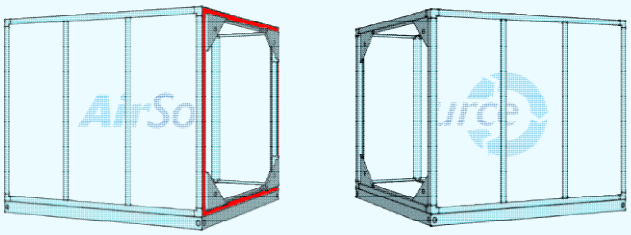
Access Side of Unit
Sufficient room at the access side of the unit is required for removal of the largest component within the AHU.

Back of Unit
Double width units require access to the front and back, therefore access requirements apply as above. Where access to components is not required at the back of the unit we recommend a minimum of 500mm is provided.

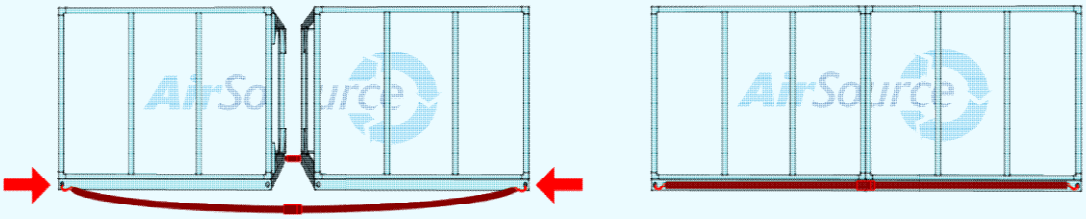
Air Intake/Discharge
Allow sufficient room for cowls to fit (dimensions as detailed on the general arrangement drawing). We also recommend an additional distance equal to the unit width before any obstacle to prevent recirculation of the exhaust air into the fresh air inlet.



Assembly of Multiple Sections

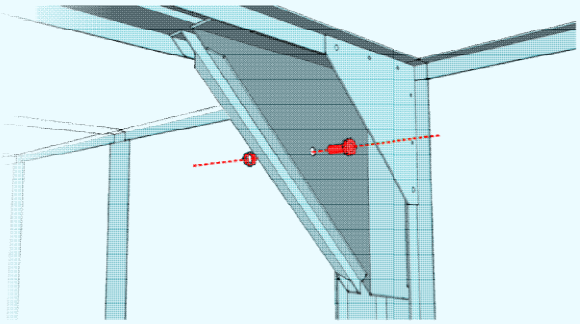


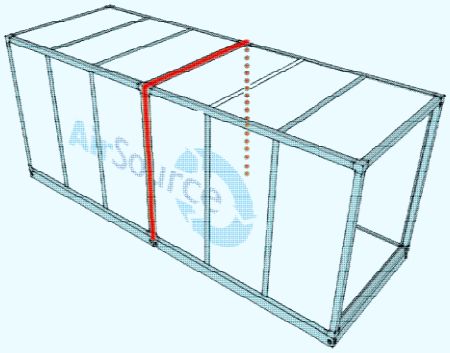
1) Apply a seal to the face of one section. Options include supplied foam or a large bead of silicone around the entire inner perimeter of the aluminium frame, as highlighted.



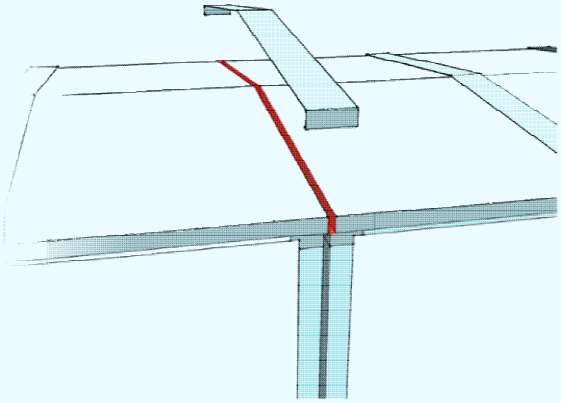
2) Pull the two unit sections together along the baseframe at the bottom of the unit using sash clamps or ratchet straps/chains, using the internal corner plates to aid alignment (One section should slot into the other). CAUTION: Before drawing together, ensure nothing will get trapped in the space between each section.

3) Once the unit has been pulled together, install assembly bolts through the corner fixing plates on the inside of the unit. For each corner, tighten the bolts, ensuring good compression of the foam sealant/silicone seal on all mating faces of the frame.





4) Apply silicone seal to outside edge to prevent ingress of water/dirt into the gap, as highlighted.



5) If the AHU has a pitched roof, seal the gap between the sections with silicone before the joining roof cap is fitted.

Electrical Connection

Do not penetrate or obstruct the removal of any doors/access panels. Where electrical cables penetrate the AHU casework, ensure that the casework is adequately sealed to prevent air leakage/water ingress. If the unit is provided with package controls then always use the cable entry as provided.

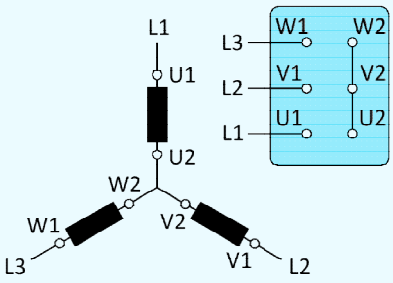
Ductwork Connection

Ensure ductwork is adequately sealed to the AHU and supported separately. Ductwork connection is to be of the size as recommended on our general arrangement drawing.

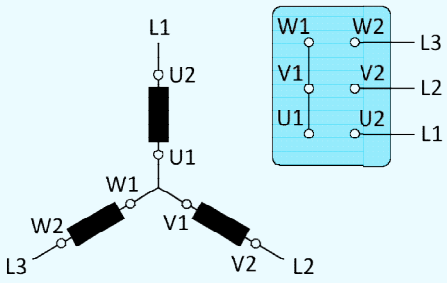
3 Phase Motor Wiring Diagrams

IT IS IMPORTANT TO USE THE CORRECT WIRING DIAGRAM AS DETAILED BELOW TO SUIT THE INCOMING MAINS VOLTAGE. FAILURE TO DO SO MAY RESULT IN PERMANENT DAMAGE TO THE MOTOR/CONTROL GEAR.

STAR Connection (Y):

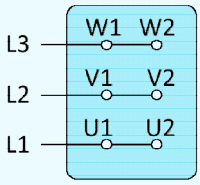


Cables enter from left



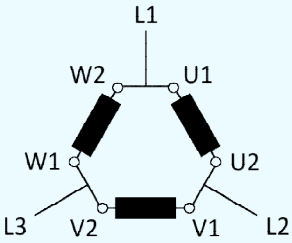
Cables enter from right

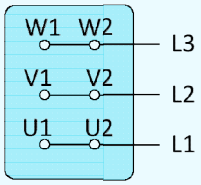
DELTA Connection (Δ):



Cables enter from left

Cables enter from either left or right





Cables enter from right

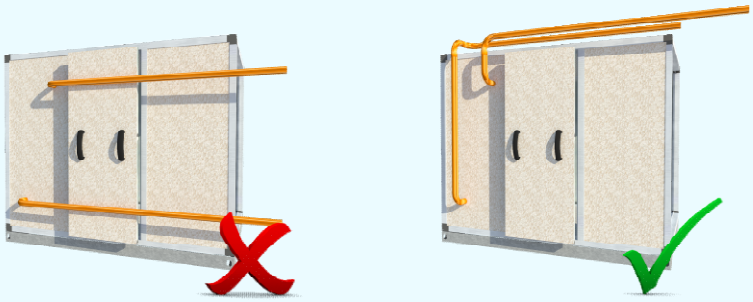
Inverters

When inverters are provided fitted to the AHU the electrical connection from the inverter to the motor will be completed at the factory, refer to inverter documentation for wiring & setup instructions.

Loose inverters may be provided for fitting and wiring by others, refer to inverter documentation for wiring & setup instructions.

Pipework

The installer should ensure that all pipework is of the correct size and lagged. Pipework must not block or restrict access to any doors or access panels.



Care must be taken to ensure the following conditions are satisfied:

- Water flow & return connections are correctly connected.
- All connecting pipework is independently supported with adequate mountings.
- Any pipe movement caused by expansion or contraction must be absorbed by flexible joints.
- Coils located at high points of the system should be regularly vented, otherwise coils may become air locked causing a reduction in duty.
- When connecting screwed fittings, it is necessary to restrain the back nut to avoid damage to the coil.

Water Coils

General

Coils are normally designed as either cartridge arrangement where they are fitted inside the casework of the air handling unit, or bolted directly between two sections of the AHU. All LPHW and chilled water coils are fitted with an air vent and drain plug on the header connections.

Drain Connections

All cooling coils include a condensate drain tray fitted with a drain connection to be connected to an appropriate trapping system. Care must be taken to ensure that the correct type of drain trap is used depending on positive / negative air pressure within the coil section (see condensate drains section).
Drain lines from the trap must be pitched downwards, a slope of 1:25 is recommended.

Ensure that the water flow & return connections are correctly connected with the water entering the coil on the leaving-air side to give counterflow for improved performance.

Frost protection

Water systems should be provided with a suitable anti-freeze solution to prevent freezing. Fluid filters are also recommended.

Steam Coils

Ensure that installation is correct to provide adequate drainage of condensate to prevent water hammer, freezing and corrosion within the coil and pipework system. Ensure that the AHU is level to avoid condensate being held within the coil tubes. The use of flexible connections or swing joints is recommended. Adequate condensate traps should be provided on each coil section and be trapped separately. Fluid filters are also recommended.

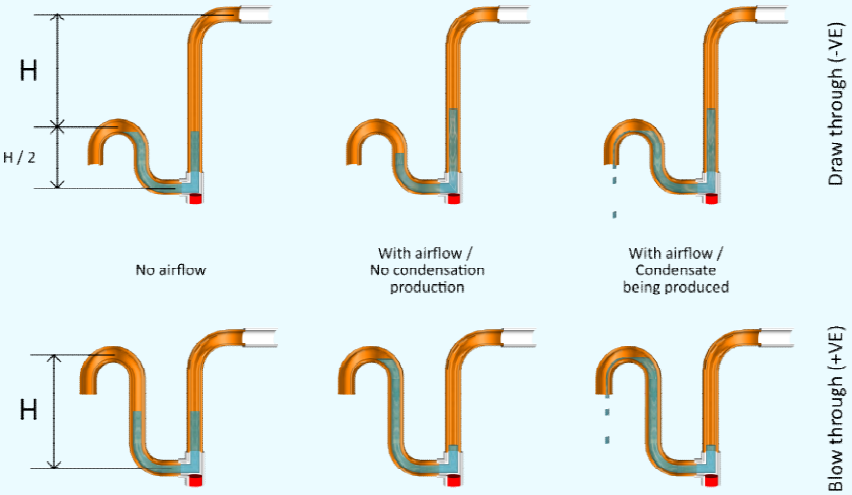
DX Coils

When brazing close to the AHU casework, take care not to cause damage to the paint or pipework seals. Following completion of the refrigeration installation, a nitrogen pressure test should be carried out on the system. All refrigerant coils should be vacuum dehydrated after installation.

Condensate Drains

All condensate drains on the AHU require a suitable trap. Drain locations are shown on our drawing. It is important to select the correct type and depth of trap otherwise a build-up of condensate may occur. IMPORTANT: Ensure that the trap is charged with water prior to start-up.

It is recommended to use large radius swept bends to avoid air locks. Ensure all pipes, including drain connections from the A.H.U. fall to drain.



$$H\,(mm) = \left(\frac{\text{TOTAL Pa}}{9.84}\right) + 25$$

COMMISSIONING & TESTING

General

All units require airside commissioning on site. The fans should be operated in hand to commission the air volume.

Fans

Pre-Start Checks

After assembly of the AHU, the following checks should be made. Refer to data chart on General Arrangement drawing for specific details. Isolate electric supply to fan-motor before entering the fan section.

- Check for any visible damage to the fan impeller and mounting assembly
- Check that anti-vibration mountings are level and that bolts are tight
- Check motor terminal cover is secure and that bolts are tight.
- Ensure all left over installation materials and other foreign objects have been removed from the fan cavity.

Test Run

Test run the motor and drive to ensure that the fan is rotating in the correct direction as identified by the arrow on the fan scroll. If the rotation is in reverse, stop the motor and reverse any two incoming supply lines to the motor or starter (3 phase supply). Check that the current being drawn by the motor does not exceed the motor full load current. Note! All access panels must be closed during this test, otherwise false readings will be obtained.

Speed Controlled Fans

Follow the instructions in the manual for the inverter. Check rotational direction and change polarity of electrical supply by reversing any two incoming supply lines to the motor to change direction if required. Set the inverter frequency as indicated on the AHU general arrangement drawing.

Packaged Controls

If the unit is complete with a factory provided control panel and the fan directions are incorrect, it is recommended that the polarity of the unit be changed at the incoming mains. This will then keep other equipment such as compressors in synchronisation. The unit will be provided with a specific wiring diagram located in the control panel. A controls philosophy will also be provided to the contractor.

OPERATION

Dampers Most dampers are opened and closed automatically via actuator with signal provided by the controller, however some may be manually operated via a lifting handle at the side of the damper.

Fans Fan switches on the front of the control panel have 3 settings: Auto, Off and Test.

'**Auto**' will enable the fans when there is a demand from the controller, which may be set via BACnet or local timeclock, dependent upon the controls configuration. This is the normal mode of operation.

'**Off**' will disable the fans so long as other criteria is satisfied (such as a electric heater fan run-on operation has been completed, and inverters, if applicable, are set to automatic mode). To ensure the fans will not run during a maintenance routine, they must be isolated using the main fan isolators mounted on the exterior of the unit in the section where the fans are physically located. If the fans are operated via inverters, it is recommended to switch off the main isolator to the unit before using the fan isolators to prevent the inverters recording a fault and requiring a reset.

'**Test**' is for air balancing purposes only. Each unit may have a different configuration. However, generally, 'Test' mode will fully open any fresh air and extract dampers, fully close any recirc dampers and run the fans at a speed which can be set by a speed potentiometer connected the control panel, an inverter control pad, or through a software setting which can be set via touchscreen if applicable. It is not recommended to run the unit in 'Test' mode, other than for air balancing purposes, otherwise the unit will not operate correctly.

Inverters Fan inverters can be controlled via a control pad installed inside the control panel interior, if applicable. Generally, there is a control pad for each fan. However, in some cases, several fans may be run from one control pad.

'**Auto**' will enable the fan when a signal is received from the controller and run at speeds determined by a combination of the settings in the inverter and a control signal. This is the normal mode of operation.

'**Hand**' will run the fan at the speed set on the control pad, which is a frequency in Hz, limited by the settings. This can be manually changed using the up and down arrows on the keypad to speed up and slow down the fan accordingly. This can be useful for air balancing purposes.

'**Off**' disables the fan.

There may be occasions when a fault is shown on the inverter control pad. If you notice a fault on the inverter, make a note of the fault code and message.

The most common fault occurs when power to the fans is isolated before the inverters are isolated. The fan will not run until the fault is reset on the control pad. This can be rectified by restoring power to the fans by switching the isolator back on, then pushing the 'Reset' button on the control pad when the fault is active. If the fault does not reset, it may be necessary to turn off power to the main isolator, then turn it back on again.

For all other inverter faults, please refer to the ABB manual.

MAINTENANCE

Fans

Due to the bearing type in EC fans, they are maintenance free. However, once the grease consumption period has expired (approximately 30000-40000 hours), it is necessary to replace the bearings.

At least every 12 months a major inspection of the fan section should be carried out as follows, whilst observing all relevant safety regulations:

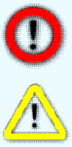
- Fully isolate electric supply to fan-motor.
- Do NOT continue until fan impeller has come to a standstill.
- Do NOT use a high-pressure jet or any aggressive, paint solvent cleaning agents when cleaning.
- Inspect and clean the fan if necessary to prevent imbalance due to ingress of dirt, using a damp cloth.
- Be careful to avoid using too much force and damaging the fan impeller.
- Keep the airways of the fan free to prevent danger due to flying objects.

Frequent inspection should be made of the fan. General inspection of the fan will depend on how essential the service, the application operating environment, and number of hours run, but should not be more than three monthly intervals. On fans operating in dusty atmospheres or exposed to weather will need to be inspected and cleaned every 3 months.

If a fan is stationary for long periods in a humid atmosphere, it should be switched on for a minimum of two hours every month to remove any moisture that may have condensed within the motor.

Electric Heater Batteries

These should be wired up in accordance with I.E.E. Regulations and local by-laws. It is essential that the heater contactor is interlocked with the fan starter to prevent the heater being energised when the fans are not running. Additionally, it is recommended that a fan run on facility is included within the controls to dissipate heat form the battery at the end of operation. All heater batteries incorporate a safety cut-out which must be wired into the controls system. Ensure the size of cable and contactors are suitable for the load being carried. It is not recommended for P.V.C. cable to be run into the terminal box. The cable should be insulated with high temperature sleeving.



Heating & Cooling Coils

Coils should be inspected every three (3) months to check for build-up of foreign matter between the fins and that coil and connections are free from leaks. Should any foreign matter be found, cleaning should be carried out with a high-pressure air line directed at the air-off face of the coil. Alternatively, the coil can be washed down with a mild solution of detergent and water, after which the coil should be thoroughly rinsed with clean water. Eliminators should be cleaned down using a soft brush and hot water, any sediment cleared out of drain tray and drain pipe, and if necessary repair any areas of corrosion.

Coils located at the high points of the system should be regularly vented.

Thermal Wheels

Cleaning

In most cases, the counterflow principle will allow the rotary wheel to self clean itself of contaminants that may adhere to the rotor surface. In situations where self cleaning is not sufficient (dependant on the degree of fouling), the rotary wheel can be periodically cleaned with compressed air or high pressure water (room temperature water only).

Belt drive

The V-belt is designated SPZ or SPA and is commercially supplied with the designated “endless V-belt”. Connection is done by flexible links. Due to the fact that the V-belt is subject to natural stretching which may well exceed the size of the tensioning device it is recommended to periodically check the tension of the belts. In particular, in the first 440 operating hours. In case the drive of the rotary wheel can no longer be guaranteed because the V-belt has insufficient tension, the V-belt has to be shortened.

Recuperators

Recuperators have no moving parts, hence mechanical maintenance is unnecessary.

When dealing with dusty and polluted air, filters should be regularly checked and replaced when necessary. It is possible to clean the unit with compressed air (in case of dust deposit) or by spraying it with a detergent solution in case of any greasy deposits. In order to remove greasy deposits, a water-detergent solution such as DECADE, ND-150, CHEM ZYME, PRIMASEPT, POLY-DET, Oakite 86m or similar should be used, following the manufacturer’s instructions.

Strongly alkaline or any products that may be aggressive to aluminium should be avoided.

Dampers

Installation

When connecting ductwork to dampers take care to ensure that damper casing is not twisted by ductwork and that fixings do not penetrate cog housing of the damper which will affect the damper mechanism. Ductwork must be independently supported and should not be left to hang from the damper. Sealing should be in the form of prestik or neoprene strip. Ensure actuator rotation is correct in relation to blade location to prevent breaking linkages.

Maintenance

At six (6) month intervals disconnect actuator and check for freedom of movement.

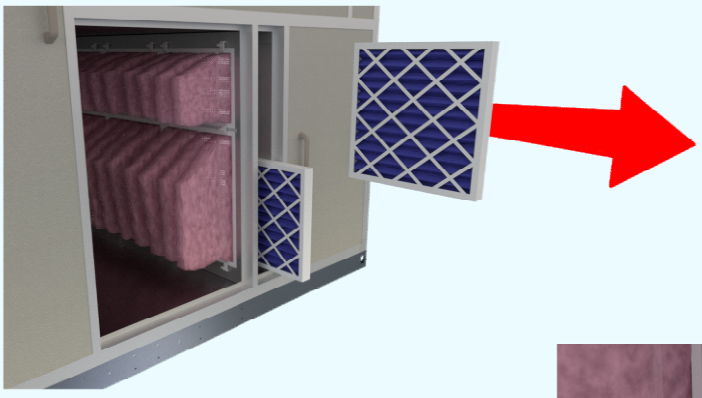
Air Filters

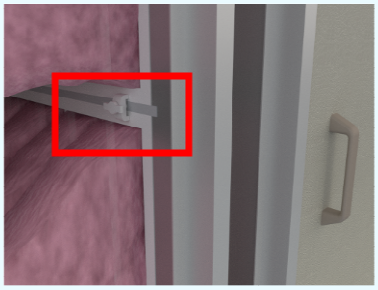
COSHH Regulations

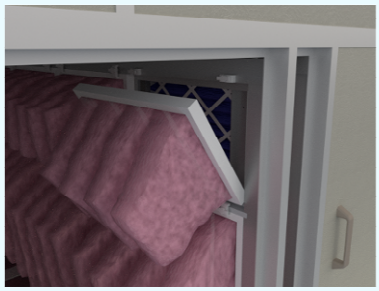
The components of filters are inherently safe, but changing air filters could expose operators to a 'Nuisance Dust' hazard. We would therefore recommend that filter changing be carried out by maintenance personnel wearing simple dust masks, eye protection, overalls or protective clothing & gloves. Dirty filters should be sealed into plastic bags for disposal.

Disposable Filters

These are supplied in the forms of panel & bag filters and are fitted into steel frames. Panel filters are removed through the access door by simply sliding the filter out along the channel runner (as shown below).







Bag Filters

Bag filters require unlocking before removal. To remove, gently turn the screw grips (as shown highlighted in the red box above) at the top of the bag filter anti-clockwise, then when the screw has been loosened enough, twist the locking mechanism horizontally to allow room for the bag filter to be removed with ease. Filters should generally be replaced when the pressure drop increases to 125pa above the initial level.

HEPA Filters (High Efficiency Particle Arrestors)

This type of filter is generally fitted in a front withdrawal frame. Filters will be held into the frame by retaining bars which can be removed to allow access to replace filters.

Carbon Filters

Carbon filters normally have an active life of about twelve (12) months, or more. It is advisable to remove a sample from the pack to return to manufacturer to determine the remaining working life, preferably after the first six (6) months & subsequent six (6) monthly intervals.

Maintenance of Units Containing Refrigerant

It is a legal requirement that all units containing F Gas refrigerants such as R407c, R410a are serviced on a regular basis and that leak tests are carried out. This should generally be carried out at least every six months and a service inspection sheet issued to the customer upon completion. Log books should be kept on site by the end user to prove that these works have been carried out. The responsibility of compliance is shared by the end user and the appointed maintenance engineers. Failure to comply with the F Gas regulations will result in invalidation of the warranty on the refrigeration system within the unit.

ROUTINE MAINTENANCE SCHEDULE

	Monthly	3 Monthly	6 Monthly	Annually
Fan Shaft Bearings				✓
Motors	✓			
Belts & Pulleys	✓			
Electric Heater Battery			✓	
Coils & Eliminators		✓		
Dampers			✓	
Panel & Bag Filters		✓		
HEPA Filters		✓		
Carbon Filters			✓	
Thermal Wheel		✓		
Recuperator			✓	
External Surfaces				✓

REFRIGERATION MAINTENANCE

Safety Warning	Ensure that all power to the unit is switched off before carrying out any servicing or maintenance task. Only trained and qualified service personnel should repair or service air conditioning equipment containing a refrigeration system. Follow all safety codes. Wear safety glasses and work gloves. Extinguish any cigarettes or naked flames. If on inspection of the refrigeration pressures a refrigerant leak is suspected, open all access panels to ensure the gas has dissipated to atmosphere.
Access	The access panel to the refrigeration service valves and switches is identified by a red flammability label. Access to the compressor section is identified on the unit drawing.
Electrical	Check all electrical connections for signs of overheating or arcing. Check all cables for signs of chafing or physical damage.

Refrigeration Circuits

4 Monthly Checks

At every service visit the following checks should be carried out: - Check the suction and discharge pressures using a service gauge manifold and compare them with the commissioning sheet. If there is any significant variation, then the fault should be found and corrected. Refer to the troubleshooting chart. If on inspection of the refrigeration pressures a refrigerant leak is suspected, open all access panels to ensure the gas has dissipated to atmosphere.
Visually examine pipework and components for damage, wear and tear and oil patches, the latter being indicative of a system leak.
Check that the high and low pressure switches are cutting out the compressors at the correct settings.
High pressure switch cut-out 320psi
Low pressure switch cut-out 30psi
Low pressure switch cut-in 50psi
The gauges can then be removed from the system. Do not forget to replace the security caps on the Schrader valves.

Annual Checks

Check all electrical connections for tightness.
Check all refrigeration connections with a foam or detergent leak detector.

FAULT FINDING

Fault	Possible Cause	Remedy / Action
Unit not operating.	No power to unit.	Check mains supply and main AHU isolator.
No Supply or Extract fans running.	Fire link open.	Inspect fireman's panel.
	Defective damper end switch.	Check actuator operation and end switch making when open.
	No power to fans	Check control switch, fuses, MCB's and control circuit wiring.
No air volume.	Fan drive or motor failure	Inspect drive belts when applicable. Check motor winding resistance.
Low air volume, fans Running, airflow fail on.	Filters blocked	Remove packaging or replace.
	Incoming phases crossed.	Check fan rotation. If incorrect change mains incoming phases over. Not individual fans.

Fault Finding Continued:

Fault	Possible Cause	Remedy / Action
No heating or cooling	Temperature controller.	Contact controls specialist.
	No air volume.	Inspect drive belts. Check motor winding resistance.
	Pressure switch failure.	Inspect fan pressure switch and tubing, replace as necessary.
	Refrigeration fault.	Contact refrigeration specialist.
Low heating output or Air Volume	Compressor fault indication.	Contact refrigeration specialist.
	Dirty filters.	Replace filters.
	Defective Heat Recovery device.	Thermal Wheel: Check wheel rotation.
		Recuperator: Check bypass damper closed on heating demand. Replace if faulty.
	Frost coil not operational (if applicable).	Contact controls specialist.
	Re-heat coil not operational.	Investigate operation of control valve.

DECOMMISSIONING & DISPOSAL

Seasonal Shutdown

Before an extended period of non-use, it is recommended to reduce the system to minimum capacity using the regulation/control system, then set any dampers to run in a recirculating arrangement (if applicable) in order to reduce risk of frost.
It is also advisable to close all control valves, then switch off any recirculating pumps, followed by closing all fresh water and manual valves. Small empty spaces suffer from a risk of frost, so it is a good idea to blow compressed air through them, if available, until they are free from residue.

Allow the fan to run until all surfaces are dry. Switch off the mains switch and lock everything up.

If the unit is not to be used for several months and the fan(s) have a belt (most non-EC fans), then it is advisable to either slacken or remove the fan belt to avoid tensioning damage during storage.

End of Life Disassembly

Before starting disassembly, the AHU and all built-in components must be disconnected from the mains and all live connections removed by a qualified electrician. Additionally, all media-bearing components must be completely emptied. This must be conducted by a specialized company which can carry out the professional disposal of water with antifreeze, and refrigerants.

The AHU can then be dismantled on-site into individual unit modules or into its component parts. It is advisable for this to be carried out by a specialized company, familiar with the environmentally friendly disposal of all component parts.

Disassembly Guide

Doors/Panels: All exterior panels and doors are constructed using plastisol and/or galvanised steel as an exterior surface, containing fibre glass insulation within, along with a polymerised acoustic barrier (if applicable) which must both be removed from the steel casing before recycling. Removal of the rivets for each door/panel can be performed by drilling. Once the two shells of the panel have been separated, other plastic components can be removed, such as door handles and locks, for separate recycling.

Fans: Once all panels and doors have been disassembled and sorted for recycling, large components can be removed, such as fans and thermal wheels/recuperators. To remove the fans, remove all fixings from where the fan flange meets the fan plate, then loosen and remove the nuts at the base of the fan. Depending on the weight and size of the fan, some specialised lifting equipment may be required to lift out the fan from inside the unit using the lifting hooks provided at the crest of the motor.

Thermal wheels/Recuperators: To remove a thermal wheel or recuperator, remove all fixings then slide out onto a suitable lifting platform, using loading straps attached to fixing points if necessary to balance. Thermal wheels are predominantly made from steel with aluminium fins, however the motor and circuit boards contain some toxic materials and must be disposed of according to local regulations for such electronic components. There are also some plastic components such as the brush fibres which may require separation. Recuperators are made from steel with aluminium fins. Removal may require first removing part of the aluminium frame.

Filters: Filters can be removed by loosening the fixings as per the normal maintenance process then recycled. Panel filters are comprised of paper cardboard, synthetic felt polymer and steel wire frame. Bag filters have a steel frame, with felt polymer comprising the main body of the filter and thus must be additionally separated into individual components for most recycling centres.

Refrigeration: Refrigeration circuits MUST be isolated and purged by F-GAS registered professionals and/or a relevant accredited professional in the applicable country by law. Refrigeration gases are destructive to the natural environment and serious fines can occur due to inadequate disposal. They must be decanted into a suitable canister and can either be recycled or taken to a lawful and registered disposal site. See BS EN 378 for more information regarding British and European guidelines on refrigerants.

Coils: When removing coils, care needs to be taken that the coils have been isolated from the main circuit and purged properly by the relevant professionals (for coils containing refrigerants). Once the inlet and outlet pipes have been disconnected and drained, remove the fixings holding the coil into place on the access side, then slide out gently onto specialised lifting equipment. Coil pipes are manufactured from copper, fixed onto a steel frame containing aluminium fins, and are widely recyclable. All pipes connecting to the coils are manufactured from copper and can either be cut out with pipe cutting equipment or removed using a cutting torch (IMPORTANT: Pipes must be purged thoroughly before removal).

Compressors: Compressors require special handling and disposal due to residual refrigerant gases which may be present in the system. Contact your local refrigeration handling facility for more information.

Dampers: Dampers blades are predominantly aluminium with some plastic components, contained within an aluminium housing which includes some plastic gears.

Frame/Other Fittings: The main frame body for the AHU consists of aluminium beams which can be removed and recycled. All other sheet metal parts are made from galvanised steel, stainless steel, or plastisol coated steel. For units with separator panels between two sections, the separator panels generally have the same composition as ordinary door/panels and can be recycled as such. Other fittings which may be recycled are the stadium knobs for holding panels, which are made from plastic. All self tapping screws and rivets are steel or stainless steel.

Sensors/Cables: All cables are copper with plastic sleeve and are widely recyclable, some sensors
(such as gas sensors and pressure transducers) may contain circuit boards which must be disposed of according to the WEEE (Waste Electrical and Electronic Equipment) directive inside Europe, or relevant RoHS directives.

Control panel: Within the United Kingdom and Europe, the majority of electronic components within the control panel will be required to be sent to an accredited waste handling centre with facilities for electrical and electronic equipment in order to safely recycle and manage electronic waste, under the terms of the WEEE (Waste Electrical and Electronic Equipment) 2012/19/EU directive which prohibits municipal disposal of some electrical and electronic components which may contain hazardous materials, such as lead and polychlorinated biphenyls. Outside Europe, please refer to local official guidelines on the correct process for handling electronic waste.